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POST SERVICE EARNINGS GROWTH RATES
OF MILITARY VETERANS
IN THE ERA OF THE ALL-VOLUNTEER FORCE

by
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POST SERVICE EARNINGS GROWTH RATES OF MILITARY VETERANS
IN THE ERA OF THE ALL VOLUNTEER FORCE

by

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ABSTRACT

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ACKNOWLEDGEMENTS

I would like to dedicate this thesis to my wife, ▮▮▮▮▮ and children, ▮▮▮▮▮▮▮▮▮▮ Throughout my career they have continually sacrificed a full time husband and father, only to be my greatest supporters when I needed it most.

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I. INTRODUCTION

A. INTRODUCTION

Since the advent of the All-Volunteer Force (AVF), the onus of providing the necessary quality and quantity of both enlistees and reenlistees has been placed squarely on the shoulders of Congress, and the budget of the United States. The argument has been that compensation in the form of bonuses, benefits, and a plethora of incentive pays and allowances will alleviate any manpower shortfall problems.

In the coming decades as the supply of military aged youth drastically diminishes [Ref. 1:pp. 90-91][1],the cost of these individuals will increase significantly. Exponential rises in the level of technology incorporated into weapons of defense will require a force structure shift toward an increasing proportion of quality recruits, further driving up the cost for each potential servicemember. Concurrently, some researchers report that capital resources may be siphoned away from national defense to pay a growing magnitude of social entitlements to a growing population of

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[1]Binkin and Eitelberg (1986) reported that of the 1.8 million men turning 18 years old each year between 1984 and 1988, the military must recruit 50 percent of those remaining after eliminating non-eligibles, and those who are college bound. By the early 1990's there will be 60,000 fewer young men entering this qualified and eligible pool, requiring an increase of necessary enlistments to 55 percent.

elderly, and toward the ballooning AIDS crisis [Ref. 2:pp. 17-20]. Interest payments on an enormous budget deficit also threatens to be a major factor in future fiscal decisions.

One practicable solution to reducing manpower short-falls, is to exploit a most significant benefit the military imparts to its members, an increase in accumulated human capital. The accumulation of human capital results from both classroom and on-the-job training, and from experience gained throughout one's military career.

Many individuals look upon the military as an investment toward their futures, as civilian occupational training and experience is expensive to accumulate. For others, including policymakers, this prime advantage of military service is often overlooked. The mission of the armed forces is to

> protect the nation's vital interests, the deterrence of war, and the attainment of the nation's objectives by use of force if war should come. [Ref. 3]

Training is directed toward preparing troops for combat and increasing force readiness. These goals do not have the tone of career enhancement, leading some to discount the military's inherent potential for increasing civilian relevant training.

The effects of military training and service on the post-service earnings of veterans therefore, becomes an increasingly important issue. There is an ever growing body

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of research concerned with the military's influence on the potential civilian earnings of veterans. Unfortunately, the conclusions appear to be contradictory. Some researchers, such as Fredland and Little [Ref. 4] and DeTray [Ref. 5], conclude that the military has positive effects on the civilian earnings of former service personnel, while others such as Oi [Ref. 6] and Cutright [Ref. 7], have reported negative impacts on the post-service earnings of these veterans.

In the future, as both labor and capital resources available to the military diminish, it becomes necessary that the most efficient uses of the budget be found to entice America's youth into military service. By determining whether military service has a positive or negative effect on the post-service earnings of veterans, and by determining the primary contributors to this effect, lawmakers and the services can better determine the most efficient training, pay, and compensation packages to enact.

B. RESEARCH QUESTIONS:

1. Primary Research Question

How do civilian earnings of veterans compare to non-veterans over time?

2. Secondary Research Questions

How does the human capital accumulated by the veteran during his years of military service compare to that accumulated by his non-military cohorts?

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What policies would be most effective in exploiting these comparisons?

II. HUMAN CAPITAL THEORY

A. BACKGROUND

Human capital refers to the present value of an individual as a "productive agent", resulting from exposure to a variety of forms of investments in human resources [Ref. 8:p. 2]. This approach provides theoretical and empirical models in which personal investments in education, or training can be used as explanatory variables to estimate changes in the marginal productivity of individuals, and the resulting inequalities in their respective earnings [Ref. 9:p. 1]. While formal education derived from high school or college has been shown to be positively correlated with increased future earnings potential, the effects of training and experience are not so clear [Ref. 10, 11:pp. 147-157, 43-59].

Human capital theory is based on three basic assumptions. First, the desired skills must be enduring, transferable, and must conform to various careers or occupations. Second, the acquired skills must contribute to current productivity as well as future productivity, correlating positively with both present and future earnings. Finally, there must be a positive association between schooling and earnings [Ref. 12:p. 2]. An individual therefore, can forego some degree of current

earnings by either attending school or working in an apprentice type program in order to realize higher future earnings resulting from these investments, the accumulation of human capital. Training raises an individual's productivity and will be acquired by individuals only if they can be assured of returns to offset their investment costs, including foregone earnings and other direct outlays.

Whether or not military service results in a significant accumulation of human capital and a corresponding increase in productivity in the civilian sector, is dependent upon the amount, and types of training and experience received.

B. SPECIFIC TRAINING

Specific training is that which has no value beyond the confines of the firm or organization. This type of training tends to apply only to a particular job within an organization.

Firms are more likely to finance specific training to workers, because although there is a training expense involved, the trained person cannot transfer the acquired skill elsewhere. The degree of training is dependent upon expected returns to the company, and the availability of training is dependent upon the returns being greater than the outlays. The trainee, on the other hand, is less likely to bear a significant portion of the cost of specific training, because his wages are not increasing, nor are his skills any more marketable. This training rarely meets the

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requirements established for the accumulation of human capital. Combat training, in most contexts, is an example of specific training within the military.

C. GENERAL TRAINING

General training refers to any accumulated education or experience that is applicable across all available careers or jobs in the economy. Reading, writing, and mathematical skills are forms of purely general training. Technical training, like that offered by the military (e.g. electronics), may be considered general training if it is transferable to similar technical occupations in other organizations.

Firms will rarely provide general training unless the worker is willing to pay for it. The individual is induced into paying for this type of training because in enhances his future market earnings potential. In a competitive market, wage rates are determined by the value of people to other firms, their marginal productivities. If a company were to provide general training it would not only have to pay for the training, but also for the increased wages of the individual as well. Firms are also restricted in their hold over employees, thus they have little guarantee of a proper return on their investment. It is more profitable to simply hire someone with the desired qualifications.

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D. TRANSFERABILITY

General and specific training act as endpoints at opposing ends of a "continuum" [Ref. 13:p. 4]. Rarely, if ever, can training be totally universal, or completely specific to a firm or organization. The transferability of training to the other organizations can be used to quantify where a program lies along the general-to-specific continuum.

Norrblom [Ref. 9] assessed the various research previously conducted on the transferability of military training. The research was separated into three categories: first, were those studies based on surveys, to gain insight into the opinions of those who separated from the military; second, were the studies based on cross-tabulations of military acquired skills versus actual chosen civilian occupations; and finally, were those studies based upon a "less sophisticated level" [Ref. 9:p. 2] of multiple regression to estimate the effects of military training using mean earnings of various groups as explanatory variables. The results of these studies, as of others that attempted to estimate potential earnings of veterans, were contradictory, and depended upon the sample selected and the method of analysis.

In the past, the preponderance of military training was in military-specific, low-tech, combat-oriented areas. The civilian-to-military pay ratio had been much much higher,

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resulting in greater foregone earnings for potential enlistees, deterring many from enlisting. Those who did enlist for general type training found high opportunity costs for reenlisting in the military, as the private sector sought out and offered higher wages to personnel with general training. The military was unable to retain its most desirable personnel, as many enlistees left following their first terms of service. During the Vietnam conflict, over 90 percent of airline pilots in the United States had received training in the armed forces [Ref. 10:p. 25].

During the last 20 years the military has undergone a metamorphosis, transforming into an all-volunteer, well paid, high tech unit [Ref. 14:pp. 2-9]. In 1960 approximately 60 percent of all military training was general and transferrable to the private sector [Ref. 15:p. 103], by 1983 nearly 40 percent of the military force was trained to be electronics technicians alone [Ref. 12:p. 7]. General training is now provided for the majority of service members, increasing their accumulated human capital, marginal productivities, and their career earnings potentials. It is this metamorphoses, causing vastly diverse sample groups, that has resulted in the contradiction between results of research detailing earnings comparisons of veterans to non-veterans.

As the military increases its use of technology it must increase its general training to servicemembers. Unlike

private industry, which often makes a practice of hiring personnel already possessing required skills, it is impractical for the military, in its desire for youth, to do the same. The military maintains an advantage over private sector firms in that it retains binding enlistment contracts on individuals. If these contracts are of optimal length they will ensure a proper return on all training outlays. Persons seeking to invest in their own stock of human capital, in the form of general training, can reduce their losses to forgone earnings, because the military now pays a comparable wage while it trains its members.

This study will attempt to estimate the value of military service on the accumulation of human capital, and the subsequent effects on potential career earnings. Specifically veteran status, military experience, and transferable military training will be examined to determine their respective contributions to the wage growth rates of veterans. Four occupational categories of general military training will be analyzed to determine their relative contributions toward the accumulation of human capital and wage growth rate. The National Longitudinal Survey of Young Men will provide the sample data. Two wage growth rate models will be estimated, using a semi-logarithmic functional form. The first regression will include veteran status while the second regression will substitute military experience for veteran status. The wage growth rate

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relationships of veterans and non-veterans will be compared to determine whether military service and training result in economic gains for veterans. The economic returns of blacks and whites will also be compared. Finally, a disaggregate sample consisting only of blacks will be examin d to compare black veterans to black non-veterans.

III. **LITERATURE REVIEW**

A plethora of research has been conducted in the areas of returns to military service and the resulting questions concerning comparative earnings of veterans and non-veterans. The earliest research by Renshaw [Ref. 16], Oi [Ref. 6], and Cutright [Ref. 7], found that military service had a negative effective on the civilian earnings of veterans. In contrast, many later studies, such as by Lopreato and Poston [Ref. 17], Fredland and Little [Ref. 4], and DeTray [Ref. 5] reported significant economic returns to veterans resulting from military service. Minority veterans particularly appear to have benefited from military service, as employers used service as a screening device, and as minorities used their service to "bridge" socio-economic gaps [Ref. 17].

In general most prior studies were conducted using cross-sectional data, primarily due to a lack of longitudinal data. While the costs of military service to individuals were fairly well known the lifetime benefit estimates may have been somewhat biased without longitudinal data. With the advent of the NLS, longitudinal data became available, however the results still appear to be mixed. Although black veterans consistently enjoy advantages over black non-veterans, the results for whites are not as clear.

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Differences in recent findings can be attributed in part to variation in data samples which are drawn from various time periods. Within the last 15 to 20 years, for example, minorities have significantly closed the gap in the area of educational and employment opportunities, thereby reducing the effect race plays on earnings. Veterans of the draft, and particularly those of the Vietnam War era, are a different breed from those veterans of today's all-volunteer, high-tech military force. The result is a wide variation in the reported conclusions of studies using these two disparate groups.

Another major variation in the results of previous research is due to differences in the methodology employed. If age is used as a factor in estimating wages in a longitudinal study, for example, the results would be significantly different, if the respondent's age at the beginning of the period were used rather than the age at the end of the period. This is primarily due to changes in the affects of accumulated human capital on individuals of different ages. The method by which the researcher defines a variable can cause differences in the results as well. In defining veterans, some researchers chose to include individuals who completed any military service as veterans, while others chose to include only those with specified periods of completed military service. This is an important distinction since those individuals who do not complete

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their service tend to receive the greatest returns from military service.

Although the majority of these prior studies attempt to estimate earnings of veterans, compare earnings of veterans to non-veterans, or estimate returns to military training using relatively equivalent, cross-sectional, war-year cohorts, they provide a firm basis upon which potential career earnings profiles may be estimated using more recent all-volunteer force era data.

A. EARLY STUDIES

Chamarette and Thomas in 1982 [Ref. 18:pp. 4-6], Reams in 1983 [Ref. 19:pp. 17-43], Higgins in 1984 [Ref. 20:pp. 15-24], and Soyak in 1987 [Ref. 21:pp. 10-21] systematically reviewed the early studies in the area of eventual civilian earnings of veterans. Table I presents a summary of these works.

1. Cutright [Ref. 7]

Cutright measured the effects of military service on the post-service earnings of veterans and compared them to non-veterans, He derived five factors in his study that were to explain all of the positive effects on earnings of the military experience: the G. I. Bill, the transferable vocational type training received while on active duty, the fact that successful service represented a positive screening device to post-service employers, veterans were less likely to return home to the south due to the prospects

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TABLE I

SUMMARY OF EARLY VETERAN EARNING STUDIES

AUTHOR AND DATE	PURPOSE	METHODOLOGY	RESULTS
1. Cutright 1972	Analyze determinants of earnings and measure the effects of military service on civilian earnings.	Compared Army Vets to non-vets, controlling for age, race, education, and I. Q.	Earnings of Vets are not higher than comparable non-vets.
2. Browning, Lopreato, & Poston 1979	Study the effects of military service on civilian earnings of minority males.	Comparison of mean incomes controlling for race, education and occupation.	Minority vets earn more than minority non-vets, supporting the bridging environment hypothesis.
3. Norrblom 1976	Examine economic effects of OJT and formal military training.	Regression analysis semi-log function. No comparison was made between vets and non-vets.	Formal vocational training has a positive effect on post-service earnings.
4. Lopreato & Poston 1977	Study effects of bridging hypothesis of military service.	Compares earnings after regression analysis by vet status. Controlling for education, age, and employment.	Black vets convert educational attainment into earnings advantages better than black non-vets.
5. Martindale & Poston 1979	Examine earnings patterns for 3 groups of vets and non-vets.	Compares earnings after regression analysis by vet status. Controlling for education, race, marital status, and employment.	Blacks and Mexican Americans are better able to convert characteristics into higher earnings than non-vets.
6. Little & Fredland 1979	Examines earnings of vets/non-vets some 20 years after most served.	Cross-sectional study utilizing regression analysis controlling any factors that contribute to earnings.	Vets had a 5 to 10% premium on earnings.

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TABLE I

SUMMARY OF EARLY VETERAN EARNING STUDIES (CONT.)

AUTHOR AND DATE	PURPOSE	METHODOLOGY	RESULTS
7. Fredland & Little 1980	Investigates specific attributes of the bridging hypothesis.	Regression analysis to determine effects of militaryy service and descriptive analysis to examine bridging variables.	Bridging hypothesis could not explain differences in earnings of vets & non-vets. Educational differences alone.
8. Fredland & Little 1980	Investigates returns to earnings from in-service vocational. training received by World War II vets.	Compares earnings effects of civilian and military vocational training of vets & non-vets.	Military and civilian vocational training yields a premium to long-term earnings for those who use it on the job.
9. DeTray 1980	Examines earnings differences between vets/non-vets.	Cross-sectional study utilizing regression analysis controlling for many factors that contribute to earnings.	Vets earn more than non-vets. Training received in the military increases civilian wages.
10. Hess 1980	Examined the value of military service for initial entry into civilian employment.	Compared vets & non-vets initial employment earnings controlling for many factors.	Initial job entry earnings of vets were higher than non-vets, but to a lesser degree during economic slowdowns.
11. Bolin 1980	Examined earnings effects from military and civilian vocational training.	Longitudinal study using regression analysis controlling for many factors including vocational training.	Vocational training, gained from military civilian source is beneficial to the individual.
12. Bolin, Hess & Little 1980	Utilizes human capital approach to compare the values of vocational training over time.	Regression analysis controlling for many factors that contribute to earnings, in particular the use of civilian and military training.	Use of military training does not have a positive effect. Vets with no in service vocational training have a negative earnings effect from military

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TABLE I

SUMMARY OF EARLY VETERAN EARNING STUDIES (CONT.)

AUTHOR AND DATE	PURPOSE	METHODOLOGY	RESULTS
13. Danzon 1980	Examines second career earnings loss of military retirees.	Regression analysis to examine earnings differences of military retirees and non-career vets.	Military retirees earn 10 to 20 percent less than non-career veterans.
14. Cooper 1981	Examines military retirees post-service earnings and employment.	Regression analysis to examine earnings differences of military retirees & non-retired veterans.	Military retirees earn 20% less than non-retired vets but worked less. If working full time, they do very well in earnings.
15. DeTray 1982	Examines the hypothesis that vet status acts as a screening device for employers.	Regression analysis to examine earnings differences of military retirees and non-career vets.	Vet status was found to act as a valuable screening device. But it could not account for the differences alone.
16. Charamette & Thomas 1982	Compares earnings factors of vets/non-vets. Examines the earnings differences of vets/non-vets and the effect of military training.	Conduct a semi-log regression analysis to determine the effect of earnings factors on the annual income.	Black vets have earnings factor advantages over black non-vets. Reverse is true for whites. Vet status have no impact on earnings by itself. Military training does not have significant returns.

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TABLE I

SUMMARY OF EARLY VETERAN EARNING STUDIES (CONT.)

AUTHOR AND DATE	PURPOSE	METHODOLOGY	RESULTS
17. Higgins 1984	Test the appropriateness of the log-linear equation in estimating life time earnings. Explains the returns to vet status. Develops a full time criterion. Tests the minimum length of service criterion.	Log-linear regression analysis was conducted for every panel of NLS survey and for pooled data by race and by vet status.	Log-linear function is proper for determining the relationship between human capital factors. Vet status is a good screening device. Full time and minimum length of service criteria should be included in the analysis.
18. Goldberg & Warner 1986	Examines the effect of civilian and military experience on the earnings of vets with the objective of determining the substitutability of these two kinds of experience.	Regression analysis was conducted for determining the quadratic earnings equation.	White vets earn more than non-white vets. Vets trained in white collar occupations have higher earnings growth than veterans trained in blue collar occupations. Transferability of military experience with civilian experience depends on the occupation category.
19. Schwartz 1986	Compares the earnings of Vietnam vets to those of Korean vets, both cases relative to non-vets.	Linear regression analysis was conducted, controlling the education, race, age, marital status.	Vietnam vets are worse off than their non-vet contemporaries in their rate of return per year of education. Korean vets were economically undistinguishable from non-vets.

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for increased wages in the north, and a vector of service-related intangibles.

Using a sample of Korean War era draftees and comparably aged non-veterans, Cutright controlled for intelligence, education, race and age. The sample was drawn from 1953 Selective Service Files linked with Social Security Data from 1958 and 1964. Cutright concluded that veterans received lower earnings than their non-serving cohorts. He further concluded that veterans having been out of the labor market during their years of service were being penalized for lost experience.

2. Poston [Ref. 17, 22]

A series of studies were conducted by Poston, and others, in the middle to late 1970's. These studies utilizing first the 1960 Public Use Sample and later the 1970 U.S. Census Population Sample, were primarily concerned with the military's effects on the earnings of minorities.

The researchers developed a "bridging environment" hypothesis [Ref. 17] professing that minorities received socio-economic advantages resulting from military service. In comparing veterans and non-veterans from WW II, Korea, and the Vietnam war eras [Ref. 22], they found that minority veterans had higher post-service earnings than minority non-veterans for all three periods of conflict. This conclusion was opposite of that for white veterans, as white veterans earnings suffered as a result of military service when

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compared to their white non-veteran cohorts. They attempted to explain the advantage obtained by black veterans, as being due to the appearance that veterans earned more from additional schooling than non-veterans. Admittedly this conclusion was found to be inconclusive when the data was disaggregated by age and residence. The studies failed to control for some significant variables, due in some cases to insufficient data.

3. **Fredland and Little [Ref. 4]**

Fredland and Little conducted a series of studies in 1979 and 1980. In their first study, "Veteran Status, Earnings, and Race: Some Long Term Results," they examined veterans who at ages 45 to 59 in 1966 had served approximately 20 years earlier, in World War II and Korea. They conducted a cross-sectional study using the 1966 NLS of Men, and found that veterans enjoyed a five to ten percent earnings advantage over their non-veteran cohorts.

In a second study, conducted in 1980, "Long Term Returns to Vocational Training: Evidence From Military Sources," Fredland and Little investigated returns to the earnings of World War II veterans resulting from in-service vocational training. They compared the resultant effects on earnings of civilian and military vocational training on veterans and non-veterans. The authors concluded that military and civilian vocational training yielded premiums

to workers who continued to use these skills in their careers.

4. Norrblom [Ref. 9]

Norrblom examined economic returns to veterans from both formal and on-the-job military training. She studied a sample consisting of 25 percent of all Army, Navy, and Air Force white separatees who left at the end of their first term of service, as documented in the Post Service Information File for FY71. There was no attempt to compare effects on veterans with non-veterans in this study. The author concluded that formal military training had a positive significant effect on post-service earnings of veterans. This conclusion may not be totally warranted based upon the depth of the survey.

5. DeTray [Ref. 5]

Detray's 1980 study entitled "Veteran Status and Civilian Earnings," using the 1971 data set of the NLS for Boys, was a detailed investigation into the causes of differences in civilian earnings between veterans and non-veterans. The author concluded that veterans earn more than non-veterans of comparable age, education, and experience, and that transferable military training increases civilian wages. In what the author reports as his most important finding, he states that "those who receive training in the military differ from other veterans and from the population at large in ways not easily measured." [Ref. 5:p. 30]   If

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this finding is in fact the case then it would explain many of the deviations in findings between Vietnam era veterans who received little other than combat, or military specific training, and all-volunteer force era veterans who are enticed into service with promises of training in basic and advanced transferable skills.

6. Bolin [Ref. 23]

Bolin's 1980 study, "Military Service Vocational Training Effects on Post Service Earnings," analyzed the effect of military service and military vocational training on the post-service earnings of veterans. This research was one of the first in this area to utilize longitudinal data, the NLS of Young Men from 1966 through 1971. Bolin used the human capital theory approach in comparing the values of vocational training over time. He found that among individuals classified by their propensity to use training, neither military training nor service were significant in estimating earnings after discharge. Bolin further reported that "disaggregation of the sample by IQ revealed that military service may be a proxy for ability level rather than a positive determinant of post-service earnings." [Ref. 23:p. 4] Finally,, Bolin reported that veterans receiving no military training had lower earnings than their civilian cohorts due to a loss in foregone civilian labor market work experience.

7. Chamarette and Thomas [Ref. 18]

Chamarette and Thomas analyzed the relationship between military service and post-service earnings of Vietnam veterans using the 1976 data set of the NLS of Young Men. The authors reported that although blacks entered the military from relatively advantaged socio-economic families, whites entered from relatively disadvantaged families. The military was enlisting the best of the blacks and the worst of the whites, thereby not getting a representative sample of society. This finding may reveal a bias in earlier research, because if black veterans are receiving greater earnings than black non-veterans following their military service it may be a result of their family's socio-economic status prior to induction rather than as a result of military service. The reverse is true for whites. The authors also reported that military training did not produce significant returns to veterans, nor did it offset the individual's losses from reduced labor market experience.

8. Goldberg and Warner [Ref. 24]

Goldberg and Warner examined the effects of civilian experience and military experience on the earnings of veterans. They were particularly interested in determining if these two types of experience, military and civilian, are substitutes for each other with respect to earnings potential. They determined that veterans trained in blue collar military occupations experienced lower civilian wage

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growth than their veteran cohorts trained in white collar military occupations. The authors reported that military training in the medical, mechanical, and electrical occupational fields were perfect substitutes for their respective civilian fields.

9. Summary of Early Studies

This review of earlier studies produces some consistent findings. Perhaps the most significant trend in these early studies is that although veterans from World War II and Korea received earnings premiums as a result of military service, their white counterparts serving in the military during the Vietnam War did not. This finding is a result of a combination of factors. It has been concluded by Charmarette and Thomas [Ref. 18] that whites entered the military during the Vietnam War from an unrepresentative group of lower socio-economic families in the United States, This finding would almost certainly bias the post-service earnings of Vietnam Veterans when compared to non-veteran cohorts. While returning veterans of the earlier wars were mostly, older and more mature, consisting of a representative sample of whites in their age group, and returning as heroes, Vietnam veterans were a younger minority, and unrepresentative of society. Due to negative societal attitudes toward Vietnam veterans in the United States, veterans were not always eager to represent

themselves as such when job hunting, thereby bypassing to some extent potential returns to their service.

Although the results reported on returns to military service may not be consistent, there does appear to be some consistency in returns to military training, specifically of transferable skills, particularly when this training is used by the veteran in his post-service civilian career. Although there is some personal gain from almost any training, transferable training tends to be vocational, and only of monetary value to the individual when used in his or her vocation. In a philosophical sense, transferability not only relates to how well military training compares to a civilian vocation, but also to how willing individuals are to use the skills obtained in the military after discharge.

Minority veterans consistently exhibit positive and significant gains from military service. Black veterans in particular display enhanced earnings over black non-veterans presumably due to returns to service. In explaining these results it has been concluded that minorities used the military as a bridge over the socio-economic gap that would have been much more difficult to traverse otherwise. From another perspective it was concluded that blacks entered the military during the Vietnam War era from the best socio-economic backgrounds. This finding, if accurate, would certainly bias earlier research in this area, particularly if this was true during the earlier war eras as well.

B. OTHER STUDIES

1. Lazear [Ref. 25]

a. Overview

In his 1976 study, "Age, Experience, and Wage Growth", Lazear attempted to distinguish between the effects of on-the-job training (OJT) from that of aging on the increase in human capital. The author, recognizing the difficulty in quantifying the OJT that an individual receives, developed a method by which he compared the effects of aging to those of work experience with the resulting difference being attributed to OJT.

Lazear analyzed the relationship between an individual's wage growth pattern and his employment history to determine if as expected, periods of unemployment resulted in less acquired human capital. If this hypothesis is determined to be accurate, a person's wage growth rate would be a function not only of that individual's age, but also of his actual time employed during the period of study. The total cost of unemployment therefore, is not only the loss of forgone earnings, but also a foregone loss in human capital that could have been accumulated during the period of unemployment. An estimate of importance of OJT is finally obtained by calculating the foregone losses one experiences in human capital investments during unemployed periods. [Ref. 25:p. 548]

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b. The Data

The National Longitudinal Survey for 1966 through 1969 provided the longitudinal data set necessary for the estimation of the effect of experience on wage growth. The Young Mens portion of the NLS consisting of males, 14-24 years of age in 1966, was used due to a propensity for males to invest more heavily in OJT than females, and for the young to invest more heavily than older workers. It was thought that the Young Men file would exhibit the most pronounced results for what was being measured. (i.e., L.C. accumulation)

The sample was reduced from 5225 cases to 1996 observations by eliminating those individuals who did not respond in both 1966 and 1969, those who reported wages less than $.50 per hour or greater than $10.00 per hour, and those cases containing missing data.

c. Results

Lazear reported the following significant results. Time spent unemployed does cost the individual in a quantifiable, lost stock of human capital that results in lower wages. Increased time on the job during the period resulted in a more rapid wage growth pattern, indicative perhaps of a concurrent increase in OJT. Surprisingly perhaps, the wage growth rate of black workers significantly exceeded that of whites, and the wage growth of unmarried individuals significantly exceeded that of married

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individuals. As expected, formal schooling results in a significantly more rapid wage growth than OJT, and union members experienced more rapid wage growth than non-members. Finally, and of most importance to this paper, the author reported that not only was military experience a positive and significant explanatory variable of wage growth, but that it also had approximatly the same effect on wage growth as an equal increment of formal schooling. Unfortunately, only 52 of the 1996 cases contained military service, resulting in a large standard error.

2. Berger and Hirsch [Ref. 26]

Berger and Hirsch examined the civilian earnings of Vietnam-era veterans and non-veterans between 1968 and 1977. The sample population was drawn from the March Current Population Surveys (CPS) from 1969 to 1978, targeting those individuals that were born between 1942 and 1952. Although the CPS is cross-sectional by design, the authors conducted a longitudinal study by using the CPS from each of the years in the study. The CPS provides a wide variety of labor market and demographic data, as well as a large sample of both veterans and non-veterans. The authors established that there were four possible explanations for differences between veteran and non-veteran earnings: military training or service effects on the productivity of the individual, the effect of veteran status acting as a screening tool for employers, differential treatment to veterans in the labor

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market, and unmeasured differences between veterans and non-veterans, such as selectivity bias. Berger and Hirsch went on to explain that differential treatment in the labor market was thought to be inconsequential, and that the other explanations resulted in "productivity differences" among individuals. Having established that productivity differences was the key element in earnings differentials between veterans and non-veterans, the authors disregarded any attempt to determine which of the original explanations led to the productivity differences.

The CPS data set was chosen because although it does not provide information on the extent to which military training and service results in veteran differences with non-veterans, the CPS is better suited than the NLS for "measuring the size and behavior of the veteran-nonveteran differential over time" [Ref. 26:p. 459]. Furthermore, while use of the NLS is advantageous because it catalogues data on the individual's personal characteristics and demographics over time, it often fails to provide adequate sample cell sizes.

Deficiencies in the CPS, the authors admit, restrict the scope of their analysis. They found that they were unable to adjust for selectivity bias, because they do not have the past history on a given individual as would be the case had they used the NLS. Another shortcoming in the use of the CPS reported by the authors, is an inability to

determine the sequence by which an individual has gained his experience and schooling. This data is necessary because of its impact on the growth factor of earnings. Presumably, the sequence and timing by which one accumulates human capital is a significant variable in determining future earnings potential.

Berger and Hirsch, in an effort to examine the civilian earnings experience of veterans and non-veterans, developed a model designed to allow the effects of veteran status to vary by birth cohort, age, and respective sample year group. The sample was partitioned into three groups based upon years of schooling, eight to eleven, 12, and 13 to 16 years. The authors controlled for the respondent's census region, proximity to a metropolitan area, marital status, race, unemployment rate, and industry groupings. They used a semilog functional form to estimate weekly wages for each schooling group of veterans and non-veterans over the 10 years under study.

The authors found that contrary to the results of earlier studies, only small differences in the earnings of Vietnam veterans existed with respect to the non-veteran cohort. Additionally, Berger and Hirsch determined that the veteran's earnings profiles, although beginning lower than their non-veteran cohort, rose more rapidly than that of the non-veterans. When the sample was disaggregated by the three levels of schooling ..t was determined that individuals

with 12 years or more of schooling experienced 1.8 to 1.9 percent lower weekly earnings than comparably educated non-veterans, while the veterans with less than 12 years schooling received premiums of 3.1 percent in return for military service. Therefore, military training and service may be of greatest benefit to those with the least education, supporting the contention that the military provides substitutes to formal education.

Finally, the authors concluded that later cohorts experienced greater earnings gaps between veterans and non-veterans than earlier cohorts. The fact that the earliest and latest Vietnam era cohorts were similar in that they were least likely to be drafted and least likely to serve in Vietnam, leads researchers to question why their respective earnings gaps with non-veterans are so diverse. The authors suggest that these inconsistencies are due to the reduction in status of military service as a screening device in the later war years, and that the later veterans were affected by shorter job tenure than the older veterans in this study.

3. Greenwood and Siegel [Ref. 27]

Greenwood and Siegel reviewed, from a human capital theory approach, recent empirical studies concerning the labor market experiences and post-service earnings of veterans. Among those areas most closely reviewed were: the effect of military service on post-service civilian

earnings, and reasons for discrepancies or contrary results between existing studies.

The authors highlighted five reasons why an integrated review of this type is necessary. First and foremost is the necessity to determine the competitiveness of military pay with respect to civilian pay, in an effort to ensure that military has the ability to attract the requisite quality and quantity of personnel to man the All-Volunteer Force (AVF). Second, they cited a need to provide information for the currently refueled military retirement pay debate. Congress in an effort to reduce military personnel costs, has determined that the military retiree compensation system is the area most vulnerable for cuts. The recent reinstatement of G. I. Bill education benefits is another area requiring assessment since many feel that it encourages the best individuals to leave the service in order to attain higher education. Greenwood and Siegel sought to further explain the "bridging" theory, in which many sociologists have argued that the military serves as a bridge into higher levels of the civilian labor market for the socio-economically disadvantaged. Finally, the authors explained a need for accurate veteran earnings estimates in order to derive accurate force projection models.

To accomplish these objectives the authors first defined human capital and provided a theoretical discussion of human capital investments along with the role that the

earnings function plays in estimating the returns to these investments. They compared the labor market experiences and civilian earnings of veterans to non-veterans considering: The transferability of military training, the effects of the G. I. Bill, the benefit of service to minorities, the draft and Vietnam War, and the use by civilian employers of military service as a "screen". Finally, Greenfield and Siegel compared the same factors of labor market experiences and civilian earnings for cohorts of military retirees and veteran non-retirees.

Throughout this research the authors remained sensitive to selectivity biases. They defined selectivity bias as arising when the sample population is not representative of the entire population being considered. For example, servicemembers with the greatest earnings opportunities are most likely to leave the service early in their careers, thus if retirees earnings are compared to those of non-retiree veterans, selectivity bias may skew the results toward the non-retirees.

The authors concluded that comparisons among studies of this type are difficult because of differences in data selection, variable definitions, time periods studied, model formulation and estimation techniques. They reported a tendency by researchers to emphasize empirical rather than theoretical issues. Although the theoretical issues, such as the human capital theory, provide the basis for most

research, the abundant use of theoretical models is prevented by data limitations, such as a lack of longitudinal data.

Greenwood and Siegel reported that selectivity bias results from four primary sources. First, the type of data used may be inherently selective in its design, therefore when used by researchers it would introduce selectivity bias. Another way to introduce selectivity bias from the data is by comparing otherwise comparable groups from different time periods, such as when one compares veterans from different wars. The education, military service, and military training will vary extensively between periods. Selectivity bias may result from the institution itself, as the military trains only those that are most capable as defined by the education level attained, and mental aptitude test scores. Behavioral differences between individuals provide the final source of selectivity bias. Personnel with the greatest civilian opportunities are most likely to leave the service, and seek civilian employment.

Interestingly, Greenwood and Siegel reported a common neglect in most previous research concerning discussions of variance in the returns to military service. The authors point out that the variance of these returns is indicative and perhaps a measurement of the risk associated with the civilian rate of returns. While most of the reported studies concentrated on the average rate of

return, which ignores its variance, it is this variance or risk which may have its greatest implications in models forecasting retention behavior.

> If differences in the variance of the returns by occupation exist, perhaps along with differences in risk preferences among military personnel, models that ignore the variance of the returns may miss a critical variable influencing retention decisions. [Ref. 27:p. 65]

Earning comparison models for veterans and non-veterans are different from those designed to compare military retirees versus non-retiree veterans. The causes of earnings variations in these two cases are different, with the veteran, non-veteran earnings estimation model most like those necessary for answering retention and force structure questions.

The authors reported five general conclusions with respect to the earnings of veterans to non-veterans. The veterans employed in areas related to their military occupations earn more than veterans who are not employed in related areas. Those veterans using the G. I. Bill to continue their education, improved their earnings over those who did not. Unfortunately, this finding may be a result of selectivity bias as those who are most qualified and able to do so choose to increase their educational level. The third conclusion of the authors is that although Vietnam veterans initially fared worse than their non-veteran cohorts, their

wage rates improved, and their earnings have increased throughout the 1970's. The authors reported evidence supporting the bridging hypothesis, indicating that the military may act as a bridge to increasing socio-economic levels via improved opportunities in the civilian labor market. The final conclusion of Greenwood and Siegel indicated support for the "screening" hypothesis as a practical alternative to the human capital model in explaining differences in earnings between veterans and non-veterans.

4. Soyak [Ref. 21]

Soyak analyzed the effect of military service and training on the post-service earnings of Vietnam-era enlisted veterans. He attempted to determine the accuracy of four hypotheses. First, he theorized that the earnings related factors of veterans were similar to those of the general population. He believed that the data could be pooled for traditionally diverse groups, specifically for blacks and non-blacks, and for veterans and non-veterans. He expected to find that military service was a substitute for civilian labor market experience, resulting in Vietnam veterans not suffering penalties in post-service earnings as a result of military service. Finally, Soyak hypothesized that military service and training resulted in equal returns to civilian training and work experience when post-service civilian income is the quantitative measure for returns.

The statistical analysis was conducted using the 1981 cross-sectional data set from the NLS of Boys. Soyak described three limitations with this data set. First, he specified that the NLS oversampled for blacks in order to provide sufficient cell sizes and separate statistics for minorities. Why this is a limitation of the NLS is not fully understood, since surveys typically oversample specific population segments in order to increase cell sizes. Second, he was concerned that because of an initially low number of observations in the sample, disaggregation of the data for analysis purposes would cause inadequate cell sizes, reducing the validity of the results. Finally, he explained that because time of discharge was unavailable for veterans, he could not distinguish between single-term and two-or-more-term veterans. This is significant because evidence suggests that increased military service beyond one-term results in higher returns to military service [Ref. 20:p. 90].

The survey originally contained 5225 respondents, however the sample was reduced down to 2677 valid observations to eliminate those who served as officers, those who did not work full time, and those who failed to respond in 1981.

The analysis was conducted in three steps. Chi-square statistics or t-test statistics were used to determine if veterans differed from non-veterans within a

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given race. The second step consisted first of using a Chow test to determine if subsamples of respondents could be pooled, then of estimating the earnings equations of blacks and non-blacks using a dummy variable for veteran status. The final step in the analysis estimated the earnings equations for veterans with race controlled as a dummy variable, to determine the effect of military specific variables on veteran's post-service earnings.

A semi-log functional model was used in both estimations of earnings. The independent variables consisted of a series of individual traits, family characteristics, job environment, personal characteristics, and military specific variables.

Soyak reported results similar to those most frequently reported by researchers using Vietnam-era cohorts. Contrary, to his hypothesis, he found that veterans received lower earnings than non-veterans, but he attributed this not only to veteran status but to other earnings factors as well.

Among non-blacks, veterans received significantly lower annual earnings than non-veterans. The non-black veterans benefitted most from marriage and residence in rural areas, while the non-veterans maintained earnings advantages over veterans in length of tenure, numbers of dependents, and hours worked per week. The remaining variables appeared to be statistically insignificant.

Among blacks the results again follow previous research. Black veterans benefitted significantly in earnings comparisons with similar non-veterans. The veterans earnings were enhanced by age, unionization, rural residence, and hourly wage variables, while the non-veterans received earnings factor advantages in the number of dependents, and work experience variables.

Chow test results indicated a necessity to reject the null hypothesis concerning the pooling of blacks with non-blacks, however the null hypothesis concerning the pooling of veterans and non-veterans was not rejected.[2]

In reporting the results of annual earnings equations for veterans by race, Soyak noted that years of schooling appeared to be the most significant and provided consistent results between blacks and non-black veterans, while the significance of place of residence varied greatly between blacks and non-blacks. Time spent in the military and length of service were not significant in estimating either annual earnings or hourly wage.

Perhaps most important for future studies, Soyak made a distinction between the branches of service and found

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[2]Since the data contained apparently different groups, such as blacks and non-blacks and veterans and non-veterans, a Chow test was necessary to determine whether the earnings equations of the diverse groups could be estimated using the same model. The null hypothesis in both cases supported pooling the opposing groups into a single sample, however the null hypothesis in the case of blacks and non-blacks was rejected as a result of the Chow test.

that this had a significant impact on the post-service earnings of these individuals. While black Army veterans fared better in post-service annual earnings than blacks discharged from the other services, non-blacks found Air Force service to be most profitable.

Soyak made five general conclusions based upon this research. First, significant differences exist between the factors effecting the earnings of veterans and non-veterans, suggesting that veteran status is only one variable in a series to be considered when doing studies of this type. Second, he determined that when estimating hourly wage rate with a semi-log function model, data cannot be pooled for blacks and non-blacks, however it may be pooled for veterans and non-veterans. Third, the effect of veteran status on earnings is inconclusive for both blacks and non-blacks. While this conclusion is in agreement with the findings of both Chamarette and Thomas [Ref. 18:p. 22] and DeTray [Ref. 5:p. 136], they are contrary to those of Little and Fredland [Ref. 4:p. 257]. Interestingly, Soyak's fourth conclusion is that black veterans enjoy higher returns to additional years of schooling than do non-black veterans. Finally, Soyak concluded that the finding regarding the effects of military training and service on the future earnings potential of veterans are inconclusive.

IV. DATA AND METHODOLOGY

A. DATA

The data used for this analysis was the 1971 and 1981 segments of the National Longitudinal Survey of Young Men (NLS), consisting of males who were 14 to 24 years of age in 1966. The survey was originally designed to last for five years, 1966 to 1971, however due to its astounding success it was extended twice, first to 1976 then later to 1981. The survey was conducted for the Office of Manpower Policy, Evaluation, and Research of the United States Department of Labor, by the Center for Human Resource Research of Ohio State University. The Bureau of the Census was responsible for the sample design, field work, and data processing. The survey was designed to create a longitudinal database for studies of the "labor market experience" of young men in the United States [Ref. 28:p. 1]. The information collected from those surveyed relates to variables that represent aspects of labor market status or activity.

The original sample consisted of 5225 participants, and although at the outset future attrition was feared to be a major potential problem, losses were kept to a minimum. An unexpectedly high 71 percent of the original sample responded in 1976, and as many as 65 percent of the

respondents remained in 1981, the final year of the survey [Ref. 28:p. 1].

The narrow range in age of those sampled, 14 to 24 years old in 1966, has both inherent advantages and disadvantages. The primary disadvantage is that the survey period only covers a small segment of the respondent's earnings profile. Conclusions concerning later-in-life effects will be more difficult to draw, and may contain greater inaccuracies. The prime advantage of the NLS design is that it provides year-by-year labor force history from the end of the formal schooling period until 1981, eliminating the need for job experience proxies that had been used in the past.

The survey was classified into three major types of variables: labor market experience variables, human capital and other socioeconomic variables, and environmental variables. The first two sets, were further subdivided into narrower categories which better defined their purposes. Environmental variables relate only to where the respondent resides, as location is a major factor in determining which labor market he participates in. Table II displays all major variable groups and sub-groups used in the NLS.

1. Sample Selection

The question must now be asked concerning the length of the period chosen for the study, 1971 to 1981. Would not "change" variables such as a change in military experience (MILEX.D2) and a change in educational level (EDUC.D2) be

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TABLE II

VARIABLE CATEGORIES FOR NLS YOUNG MENS SURVEY

A. **LABOR MARKET EXPERIENCE VARIABLE CATEGORIES**

1. Current Labor Force and Employment Status
2. Characteristics of Last Job
3. Work Experience Prior to Initial Survey
4. Work Experience Since Previous Survey

B. **HUMAN CAPITAL AND OTHER SOCIOECONOMIC VARIABLE CATEGORIES**

1. Early Formative Influences
2. Migration
3. Education
4. Training Outside Regular School
5. Health and Physical Condition
6. Marital and Family Characteristics
7. Financial Characteristics
8. Military Service
9. Job Attitudes (current job)
10. Work Attitudes (work in general)
11. Educational and Occupational Aspirations and Expectations
12. Other Socio-psychological Variables
13. Retrospective Evaluation of Labor Market Experience

C. **ENVIRONMENTAL VARIABLE CATEGORIES**

enhanced using longer periods of a longitudinal study? The answer is both yes and no. The military, and the nation as a whole, underwent periods of drastic change between 1966 and 1981, the entire length of the survey. Specifically, the Vietnam War until 1973, the institution of to an all volunteer force in 1974, and the economic recession of the late 1970's resulted in extremes not normally experienced within so short a time period.

The Vietnam War produced an inordinately high proportion of veterans receiving only military-specific, combat training. This type of training is rarely transferable to the civilian sector, and results in lower economic returns to military service. These veterans did not attempt to get all that they could from the military because they were concerned only with survival and their eventual discharge. The post-war shift to an all-volunteer military, combined with a concurrent shift toward more highly technical weapons of war, resulted in veterans being discharged with increasingly technical and transferable skills. These personnel were under enlistment contracts, guaranteeing the military a sufficient length of service to ensure a return on its training investment. The military was therefore induced to train more people in transferable skill areas, resulting in greater private returns to military service. The opposing characteristics of these two types of veterans would offset each other in a study of

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the returns to military training. Therefore, if one desires to study this unique period in history the entire period may be useful. However, if a researcher desires to estimate the future returns to military training in a volunteer force context, the period should be split; then the period under study should be as long as practicable to ensure sufficient cell sizes.

A sample consisting of respondents who were represented in both the 1971 and 1981 surveys was selected. The sample size was further reduced by dropping observations with missing data. Additional reductions in the scope of the sample were not conducted for three reasons. First, the survey maintained an existing, relatively homogeneous sample population, all males within ten years of age of each other. Second, the sample in its entirety was by design, with the exception of an over-representation of blacks, representative of the male population of the United States within that age group. Finally, further reductions of the sample would reduce the valid number of cases below that necessary for obtaining accurate estimates. The final sample size was 1561.

2. Data Analysis

Tables III and IV provide a summary of the descriptive statistics of the resulting sample population. Included in Table IV are the means and standard deviations for each variable used in the multivariate analysis, as well

TABLE III

SUMMARY OF DESCRIPTIVE STATISTICS

VARIABLE DESCRIPTION (NAME)	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
1. YEARS EDUCATION IN 1971 (EDUC.71)	12.67	2.56	0	18	2323
2. YEARS INCREASE IN EDUCATION 1971 TO 1981 (EDUC.D2)	0.83	1.13	0	9	2323
3. YEARS TENURE IN 1981 (TENUR.81)	6.78	5.17	0	21	2316
4. TYPE MILITARY TRAINING (TTYPE.81)	.14	.35	0	1	2323
5. VETERAN IN 1981 (VET.81)	.31	.46	0	1	2323
6. BLACK	.23	.42	0	1	2323
7. MARITAL STATUS 1971 (MRSTA.71)	.53	.50	0	1	2323
8. WAGES DETERMINED BY COLLECTIVE BARGAIN, 1981 (UNWAG.81)	.31	.46	0	1	2228
9. CHANGE IN NORMAL HOURS WORKED PER WEEK 1971 TO 1981 (HOURS.D2)	3.28	12.80	-54.0	92.0	1843
10. MONTHS CHANGE IN MILITARY EXPERIENCE 1971 TO 1981 (MILEX.D2)	.11	2.04	0	67.0	1930

TABLE IV

SUMMARY OF VARIABLE VALUES BY PERCENT OF THE SAMPLE

VARIABLE DESCRIPTION (NAME)	VALUE	PERCENT
1. YEARS EDUCATION IN 1971	0-11	20.0
(EDUC.71)	12	36.4
	13-15	26.4
	16	6.3
2. YEARS INCREASE IN EDUCATION	0	53.8
1971 TO 1981	1.0	23.6
(EDUC.D2)	2.0	13.6
	3.0	5.5
	≥4.0	3.5
3. YEARS TENURE IN 1981	≤2	28.6
(TENUR.81)	3-5	19.0
	6-8	14.2
	9-11	16.6
	≥12	21.2
4. TYPE MILITARY TRAINING	TRANSFERABLE	58.4
(TTYPE.81)	MILITARY SPECIFIC	41.6
5. VETERAN IN 1981 (VET.81)	VET	30.7
	NON-VET	69.3
6. BLACK	BLACK	22.8
	NON-BLACK	77.2
7. MARITAL STATUS 1971	UNMARRIED	46.6
(MRSTA.71)	MARRIED	53.4
8. WAGES DETERMINED BY	NO	65.9
COLLECTIVE BARGAIN, 1981	YES	30.0
(UNWAG.81)	DON'T KNOW	4.1
9. CHANGE IN NORMAL HOURS	≤-1	23.9
WORKED PER WEEK 1971 TO 1981	0	37.3
(HOURS.D2)	1-5	11.6
	6-10	10.2
	≥11	17.0
10. MONTHS CHANGE IN MILITARY	0	98.9
EXPERIENCE 1971 TO 1981	1-12	0.9
(MILEX.D2)	≥13	0.2
11. TIME IN YEARS UNEMPLOYED	0	94.4
(TNEMP)	≥0.1	5.6

as the minimum and maximum values and valid number of cases (N) of each variable. Table V contains the value range and frequency distribution of each variable.

B. METHODOLOGY

1. The Model

The model used in this study is based on the work of Edward Lazear [Ref. 25]. Table V describes the variables used by Lazear.

Lazear began with a model depicting wage growth over time utilizing the following functional form:

$$W_{69i} = AW_{66i}e^{(\delta t + u)} \tag{4.1}$$

where:

W_{69i} = represents hourly wage rate in 1969 for individual i.

W_{66i} = represents hourly wage rate in 1966 for individual i.

A = represents a non-measured cohort and business cycle effect. It is invariant across individuals, but unique to a particular period under study.

δ = represents average annual wage growth rate varying across individuals.

u = random error term.

t = time in years.

The average annual wage growth rate is dependent upon aging and the acquisition of human capital, thus:

$$\delta = A_0 + A_1(\Delta S_i) + A_2(\Delta OJT_i) \tag{4.2}$$

where:

ΔS = increase in highest grade of schooling during the period.

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TABLE V

LAZEAR'S WAGE GROWTH VARIABLES (1976)

VARIABLE NAME	EXPLANATION
DEPENDENT VARIABLE	
1. $\ln W_{69} - \ln W_{66}$	Dependent variable consisting of hourly wage in courts (selected cases only within the range of $.1/HR to $10.0/HR, others considered missing).
EXPLANATORY VARIABLES	
2. S_{66}	Highest grade of school in 1966
3. E_{66}	Initial amount of job experience
4. $(S_{69} - S_{66})$	Increase in schooling over period
5. Age	Respondent's age
6. D	Respondent's race (white or non-white), a dummy variable
7. CM	Number of years change in military experience (1966 to 1969)
8. M	Respondent's Marital Status in 1966
9. U	Dummy variable indicating union membership, or not 1969.
10. TN	Time in years not employed
11. CH	Change in usual number of hours worked between 1966 to 1969

(Source: Lazear, E. "Age, Experience and Wage Growth", American Economic Review, v. 66, September 1976.)

ΔOJT = increase in accumulated OJT during the period.

As previously stated the OJT can not be directly measured, however it can be estimated assuming that

$$\Delta OJT = b_1(\Delta EXP) + b_2(E_{66}) + b_3(S_{66}) + b_4 AGE$$

(4.3)

where:

$\Delta EXP = (i-TN_i)$ = increase in job experience during the period (in years).

E_{66} = initial of job experience held by individual (in years).

S_{66} = highest grade of schooling completed by the start of the period.

AGE = age of the individual at the start of the period.

therefore:

$$\delta = A_0 + A_1(S_{66}) + A_2(E_{66}) + A_3(\Delta S) + A_4(TN) + A_5(AGE)$$

(4.4)

Substituting Equation 4.4 into Equation 4.1 and taking the log of both sides results in

$$\ln W_{69} = \ln A + \ln W_{66} + t[A_0 + A_1(S_{66}) + A_2(E_{66}) + A_3(\Delta S)$$
$$+ A_4(TN) + A_5(AGE)] + u$$

(4.5)

or

$$\ln W_{69i} - \ln W_{66i} = \beta_0 + \beta_1 S_{66i} + \beta_2 E_{66i} + \beta_3(\Delta S) + \beta_4 TN_i$$
$$+ \beta_5 AGE_i + u_i$$

(4.6)

Lazear, having included all anticipated human capital variables in his wage growth equation determined

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that other factors were necessary in estimating the wage growth model as well. "D" is a dummy variable set equal to one for white respondents, "M" is a dummy variable equal to one for respondents married at the beginning of the period, "U" a dummy variable set equal to one for those who were members of unions at the beginning of the period, "CH" is the change in usual number of hours worked between the beginning and the end of the period, "CM" is the change in military experience between the beginning and the end of the period.

Lazear included union membership and marital status variables in the equation due to personal expectations of their affect on wage growth. He included race as an explanatory factor, because he expected that blacks may have different reasons to invest in OJT than whites. Most importantly for later military related studies, the author determined that military experience represented an alternative method of acquiring human capital, thus he included the change in military experience variable. Table V provides a list of Lazear's wage growth rate model variables and a brief explanation of each.

2. Methodology

An initial list of variables were derived from the research review. This list was then compared to the list of available variables from the NLS Young Mens survey. The comparable variables were then considered for inclusion

into the model. A simple correlation matrix was examined as a first step in determining if multicollinearity existed between the explanatory variables. No variables were found to be significantly collinear (> .440). The rule-of-thumb to be used in this case is that multicollinearity is a potential problem if the squared simple correlation coefficient $(r_{x_i,x_j})^2$ is greater than the unadjusted R^2 of the estimation equation [Ref. 29:p. 190]. This relationship will be examined when the model is estimated, and the results reported in Chapter V. Preliminary crosstabs and condescriptives were analyzed, identifying a need to truncate the military training type into transferable training and non-transferable training variables, because of otherwise small cell sizes. A log-linear model form, as specified by Lazear [Ref. 25:p. 549] was used to estimate wage growth equations.

3. Explanatory Variable Selection

The selection of variables, and ultimately the expected signs of these variables, were determined by studying previous research, primarily that of Edward Lazear. Although many researchers had attempted to estimate earnings, few, other than Lazear, had attempted to estimate changes in earnings over time, i.e., wage growth. Table VI provides a summary of variables used in the estimation equation in this study, along with their respective expected signs.

TABLE VI

SUMMARY OF PRELIMINARY VARIABLES WITH EXPECTED SIGNS

VARIABLE NAME	DEFINITION	EXPECTED SIGN
DEPENDENT VARIABLE		
1. ln (EARNX.81 – EARNX.71)	Log change in annual earnings 1971 to 1981 (none missing)	(+)
EXPLANATORY VARIABLES		
2. EDUC.71	Educational level attained in 1971	(+)
3. EDUC.D2	Increase in educational level between 1971 to 1981 EDUC.D2 = (EDUC..81 – EDUC..71)	(+)
4. AGE.71	Respondent's age in 1971	(–)
5. HOURS.D2	Change in usual number of hours worked per week between 1971 to 1981. HOURS.D2 = (HOURS.81 – HOURS.71)	(+)
6. BLACK	Dummy variable indicating race as BLACK = 1, NON-BLACK = 0	(–)
7. MRSTA.71	Dummy variable indicating marital status as either married or unmarried in 1971. MARRIED = 1, NON-MARRIED = 0	(+)
8. MILEX.D2	Increase in months of military experience 1971 to 1981 MILEX.D2 = (LNGTH.81 – LNGTH.71)	(+)

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9.	TNEMP	Time in Years respondent was unemployed between 1971 to 1981	(-)
10.	TENUR.81	Time in years continuously employed in current firm	(+)
11.	VET.81	Dummy variable indicating whether respondent was a veteran or not. VET = 1, NON-VET = 0	(+)
12.	TTYPE.81	Indicates type training received in the military--Later truncated into dummy variable, GENTRA for transferable training.	(+)

The highest grade of schooling completed in 1971, EDUC.71 was chosen as an explanatory variable because investment in education has long been considered to be a major contributor toward accumulating human capital, and thus a significant contributing factor toward earnings potential. The evidence on the wage effect of additional formal education is overwhelming. Mincer [Ref. 11:pp. 48-51] reported significant increases in earnings potential among white males in non-farming occupations as a result of completing additional education. The most significant increases occurred at the eight, 12 and 16 year levels corresponding to graduation from junior high school, high school, and college. An individual could increase his average annual earnings by up to 100 percent by completing

high school and college. Houthakker [Ref. 30:pp. 116-122] reported similar findings to those of Mincer, with the most significant and profound increases in earnings between those that started, but did not complete college, to those that successfully completed 16 or more years. Becker [Ref. 10:p. 157] reported that although increases in education resulted in increases in earnings, these estimated may be "grossly overestimated because persons differing in education also differ in many characteristics that cause their incomes to differ systematically," such as ability [Ref. 10:p. 157].

Whereas EDUC.71 could be used to estimate earnings potential, a change variable was necessary to estimate the impact on the growth of wages. EDUC.D2 provides the change in education over the entire period. As was the case with the accumulation of initial education, an increase in education is expected to enhance one's future earnings abilities.

The respondent's age at the beginning of the period, (AGE.71) may also be an important determinant of wage growth. Its effects are derived from the propensity of younger individuals to invest more extensively in human capital than older people. The younger workers have lower opportunity costs due to lower foregone earnings, and longer payback periods than do older individuals. The rate of human capital accumulation relates directly to the slope of the age-earnings (wage-growth) profile, and since younger

people invest more heavily in human capital their respective wage growth curves are steeper than those of their elders. As people age their incentives to invest in human capital declines, and there is a resulting deceleration in the rate of earnings growth [Ref. 31:p. 297]. It is expected therefore, that a respondent's age in 1971 would be a negatively related to wage growth over the period.

A change in the usual number of hours worked (HOURS.D2) during the period under study is expected to affect wage growth because holding wages constant, an increase in the usual number of hours worked would explain a significant portion of wage growth. Another reason is that increasing the number of hours worked means increasing on-the-job experience. Since this increased experience may coincide with an accumulation of marketable human capital, a resulting increase in wages should be expected.

In the same vein as HOURS.D2, it can be expected that time not employed (TNEMP) during the period of study would reduce earnings potential, due to concurrent losses in experience during these non-employed periods. It is also expected that the effect of experience on future wage growth can be derived from that of previous experience on wage growth. TNEMP represents the wage growth potential of increased work experience in the current period. The necessity for this variable is based upon the anticipation that those with greater early experience will invest less

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later on, due to increased incentives for early investments. The result is varying investment rates for individuals based upon their experiences prior to the period studied. [Ref. 25:p. 555]

If military experience is found, as hypothesized, to significantly affect future earnings potential, then a variable must be included in the estimation equation that represents changes in military experience. MILEX.D2 is the military experience variable, measured in months of service, having been attained by 1981, minus the months of service attained by 1971. This variable, although necessary, appears to have an inherent drawback. Although it recognizes the change in military experience of all respondents who completed military service after 1971, it fails to recognize those who completed their tours of service before 1971. The reason for this phenomenon is that if the individual completed his service by 1971, say for example 24 months, then in 1981 he will have completed the same 24 months of service, and when the two values are subtracted MILEX.D2 = 0.

Because of this drawback a second measure of military experience is constructed. VET.81 is a dummy variable indicating whether or not a respondent was a veteran in 1981. A veteran is defined as one who has completed at least 18 months of active service. This variable should reduce inaccuracies that may have been

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inherent in the MILEX.D2 variable. Due to obviously unsuitable multicollinearity between the MILEX.D2 and VET.81 variables, the equation will be estimated, once with each of these variables.

Individuals whose wages are subject to collective bargaining arrangements, either through unions or otherwise, stand to gain monetarily over workers who are not collectively represented in negotiation. Muchinsky [Ref. 32:p. 631] reported that unions through collective bargaining have increased wages, and have successfully bargained for increased pensions, insurance, and vacations. A dummy variable (UNWAG.81) was therefore introduced to explain the variation in wages due to collective bargaining. The decision to use collective bargaining status in 1981 vice 1971 is based upon the desire to estimate future earnings. It is expected that an individual who belongs to a collective bargaining group in 1981 is more likely to remain in one than an individual who belonged to such a group in 1971 is of rejoining one.

Lazear [Ref. 25] and Mincer [Ref. 11], among others, reported that experience plays an important role in wage determination. Of equal importance to the degree of experience, or human capital, that one accumulates, is the place where it is acquired. Tenure with a specific firm or company should result in greater wage returns to the individual for two reasons. First, in moving from job to

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job many individuals lose work time, thus they lose work experience, resulting in a minimal yet present loss of wages for each week of lost time. Second, with increasing tenure, many individuals manage to convey a sense of greater urgency for their services within an organization than may actually be necessary. They find a niche or build a small "empire", making themselves indispensable thus increasing their value to the firm. In contrast, there is evidence to support the argument that economic returns to job mobility exist, and that movers may be more motivated and able than those that stay. TENUR.81 represents the tenure in years that the individual has remained continuously employed at his current firm.

Marital status (MRSTA.71) has long been determined to be a significant contributing factor in estimating wages and earnings. Norrblom [Ref. 33] and Bolin [Ref. 23:p. 50], among others, reported that being married was a significant- ly positive factor in determining wage variation. MRSTA.71 is a dummy variable representing whether or not the respondent was married in 1971. The individual was considered to be married only if he was actually married at the time of the survey with his spouse present.

Earnings variations due to the race of an individual can also be a significant factor. Reams [Ref. 19:pp. 81-81] displayed significant differences between the wages of whites and blacks. Although white veterans reported lower

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annual civilian wages than their non-veteran cohorts, Reams reported significant gains made by blacks as a result of military service. The dummy variable "BLACK" is used here to indicate whether respondent was black or non-black. Cohaney [Ref. 34:pp. 13-15] reported major variations in employment and employability as a result of military service. Blacks although not achieving the same earnings as whites, do achieve significantly positive returns from military service over black non-veteran cohorts, in contrast to whites who do not.

In examining the initial equation it was determined that an additional variable was necessary to distinguish between the returns from transferable types of military training and training consisting primarily of non-transferrable, or military specific qualities. TTYPE.81 was selected to be used in the equation because it was just such a variable. TTYPE.81 distributed veteran respondents to the 1981 survey among nine types of training categories consisting of none, professional and technical, managerial, clerical and sales, skill manual, general education, military only, officer candidate school, and other. These nine categories, being too specific, were truncated down to four, more general areas. After having completed a frequency analysis of the data, it was determined that cell sizes were too small, in one case only 69 respondents had completed a particular category of training. The variable

was further truncated into two categories, military-specific training versus transferable training. The reduction in the number of categories was necessary to reduce inaccuracies resulting from cell sizes of insufficient size. Table VII displays the process by which the original nine variables were truncated down to two. Table VIII displays the categories of military training available from the NLS along with frequencies of individuals in each category.

4. Dependent Variable

The dependent variable, LERNX.D2, is the log of the change in annual earnings between 1981 and 1971. The difference in earnings over the period exhibits the desired wage growth aspect of the model. Cases of negative and zero earnings differences between 1971 and 1981 were deleted.

TABLE VII

STEPS IN TRUNCATING
TRAINING TYPE VARIABLES

ORIGINAL VARIABLE SET	FIRST TRUNCATED STATE	SECOND TRUNCATED STAGE
NONE MILITARY ONLY OCS OTHER	MILITARY SPECIFIC	MILITARY SPECIFIC TRAINING (MILSPEC)
PROFESSIONAL & TECHNICAL MANAGERIAL	PTM	
CLERICAL & SALES SKILLED MANUAL	CSM	GENERAL TRANSFERABLE TRAINING (GENTRA)
GENERAL EDUCATION	GENERAL EDUCATION	

TABLE VIII

SUMMARY OF MILITARY TRAINING TYPES
BY FREQUENCY AND PERCENT

TYPE TRAINING	VALUE	FREQUENCY	PERCENT
NONE	0	273	21.6
PROFESSIONAL & TECHNICAL	1	202	16.0
MANAGERIAL	2	28	2.2
CLERICAL & SALES	3	69	5.5
SKILLED MANUAL	4	217	17.2
GENERAL EDUCATION	5	134	10.6
MILITARY ONLY	6	117	9.3
OCS	7	36	2.9
OTHER	8	71	5.6
DON'T KNOW	9	115	9.1

V.   DATA ANALYSIS AND RESULTS

A preliminary analysis of the data indicated that a potential problem existed with the military experience variable. Of the 1262 valid number of cases, 66.6 percent contained missing values for this variable.   Of the remaining observations only 25 cases, or 2.2 percent of the sample exhibited any change in military experience during the study period.   This low number of responses is probably due to two factors.   First, the preponderance of those who served in the military may have already completed their service by 1971, as they would have been 19 to 29 years of age at this point.   If accurate, this assumption could bias future results concerning all-volunteer force era veterans, based on these data, because the majority of veterans would not have been from the all-volunteer force era.   Of those remaining to do service, the prevalent attitude of the time, by 1971, was to avoid the military.   The second factor which may have affected the change in military experience, is the likelihood that some NLS Youth members were still on active duty in 1981, and were unavailable to respond to the 1981 portion of the survey.   Although this would not have affected a large number of respondents, it could have resulted in the loss of data from a relatively large number of those veterans with remaining service.

Two variations of the semi-log earnings growth model, described above, were used to estimate the earnings growth potential of veterans and non-veterans. The first of these models attempted to determine the effects of veteran status, while the second attempted to determine the effects of military experience, on the annual earnings growth rate of veterans.

A. EFFECTS OF VETERAN STATUS ON EARNINGS

Table IX presents a summary of the results of estimating the earnings growth model. Table X provides a matrix of simple correlation coefficients of explanatory variables in the regression equation. "Time not employed" and "general training acquired in the military" were found to be insignificant. Although these findings are not consistent with the original hypothesis, there are practical explanations for them. The "time not employed" variable was calculated from weeks of employment. Almost invariably the respondents reported full employment for the entire year. In 1976 the mean was 52.00 weeks of employment, and in 1981 this value had dropped to only 51.13 weeks. Certainly then, unemployment cannot be expected to produce significant results.

General military training, consisting of five categories of transferable military skills, was also found to be insignificant (P = .644). Although an analysis of the 1981 data indicates that 11.3 percent of the veterans reported

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TABLE IX

REGRESSION RESULTS OF EARNINGS GROWTH RATE MODEL
WITH VETERAN STATUS

VARIABLE NAME	B	STD ERR	P
SIGNIFICANT EXPLANATORY VARIABLES			
EDUC.D2	.039	.015	.012
EDVC.71	.115	.007	.001
MRSTA.71	.139	.035	.001
TENUR.81	.025	.003	.001
HOURS.D2	.007	.001	.001
VET.81	.130	.046	.005
AGE.71	− .018	.006	.001
UNWAG.81	.068	.034	.048
BLACK	− .281	.039	.001
INSIGNIFICANT EXPLANATORY VARIABLES			
TNEMP	4.641	7.001	.508
GENTRA	.026	.057	.644

EQUATION CHARACTERISTICS

R^2	.269	N Cases	1839
Adj. R^2	.265	Durbin-Watson Test	1.948
F Statistic	61.225	Significance	.001

TABLE X

CORRELATION COEFFICIENT MATRIX

	EDUC.71	MRSTA.71	AGE.71	BLACK	TENUR.81	GENTRA	UNWAG.81	HOURS.D2	LERNX.D2	EDUC.D2	VET.81	TNEMP
EDUC.71	1.000											
MRSTA.71	-.004	1.000										
AGE.71	.083	.406	1.000									
BLACK	-.322	-.105	-.054	1.000								
TENUR.81	.000	.200	.286	-.022	1.000							
GENTRA	.016	.050	.122	-.095	.016	1.000						
UNWAG.81	-.095	.033	-.020	.040	.151	-.001	1.000					
HOURS.D2	.183	-.134	-.176	-.083	-.133	-.036	-.103	1.000				
LERNX.D2	.134	.088	.029	-.297	.150	.083	.016	.173	1.000			
EDUC.D2	-.036	-.144	-.171	-.007	-.162	.078	-.077	.202	-.036	1.000		
VET.81	.007	.039	.133	-.078	.010	.669	.035	-.047	.093	.031	1.000	
TNEMP	-.005	.019	-.005	.042	.009	.053	.034	-.006	.012	-.016	.035	1.000

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having used their military training in their civilian careers, up from a value of 5.4 percent in 1971, it appears that the relatively small number of respondents in this category with respect to the entire sample dilutes the effects of military training. In a regression analysis consisting of a veterans-only sample, this general military training variable was also found to be insignificant (P = .165).

The increasing use of military training during the period by veterans in their civilian careers, provides another interesting relationship. If the assumption is correct that the majority of veterans in this cohort had completed military service by 1971, then why is there a reluctance on the part of these individuals to, at least initially, use their military training in their careers? There are at least two possible explanations. First, veterans in an effort to forget the "Vietnam experience", attempted to divorce themselves completely from anything that they associated with the military. With time these veterans may have been able to return to these occupations without exhibiting ill feelings. Secondly, and perhaps more likely, veterans as a group were not as acceptable to either communities, nor to potential employers, in 1971 as they were in 1981. Although they were able to find work, they may not have been able to find employment in their preferred careers until years later. Table XI exhibits the

TABLE XI

CROSSTABULATION OF USE OF MILITARY TRAINING
BY BRANCH OF SERVICE, 1981

BRANCH OF SERVICE	UTILIZED TRAINING		TOTAL	PERCENT UTILIZATION BY BRANCH
	NO	YES		
NAVY	91	18	109	16.5
ARMY	387	47	434	10.8
AIR FORCE	55	12	67	17.9
MARINES	51	4	55	7.3
COAST GUARD	3	0	3	0
T O T A L NUMBER	587	81	668	
T O T A L PERCENT	87.9	12.1	100.0	
NUMBER OF MISSING OBSERVATIONS			46	
TOTAL NUMBER OF VETERANS			714	

frequencies by which veterans utilized their military training by branch of service.

As previously discussed, although this thesis was intended to gain insight into the wage growth potential of post-Vietnam era veterans, it appears now that the sample was heavily biased toward veterans serving during the Vietnam War period. This shift in the sample population from what was desired to what was actually used could have adversely affected the results. However, upon analyzing these results there appears to be little deviation from what was expected. Of the eleven explanatory variables, nine were significant, each of which possessed the hypothesized sign.

Of particular note, is the performance of the veteran status variable in the estimated equation (Table IX). Veteran status, in contrast to many earlier studies, was found to have a significant and positive effect on earnings growth (β = .130, P = .005). Also of interest is that of the nine significant variables, only four were more important than veteran status in explaining the movements of the dependent variable. Interestingly, 49.7 percent of the veteran cohort reported that service in the armed forces helped them in their present careers.

The two education variables played major roles in the estimated equation. Both higher initial levels of education and increases in educational levels during the period were

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significant and positive factors in determining wage growth. As expected, the educational level attained by 1971, the start of the study period, was one of the most significant variables (P = .001) in the earnings growth rate equation, while the change in education variable was not as significant at a level of .012. This is due to the relatively low number of individuals seeking additional schooling after 1971, when the youngest member of the sample cohort was 19 years of age. Although 46.2 percent of the respondents increased their levels of education by one or more years, only 3.5 percent increased by four or more years. Among veterans, the G.I. Bill education benefits were used by a mere 16.4 percent of eligible respondents.

Consistent with previous research, blacks were found to have a significantly lower wage growth rate than whites. The "black" dummy variable has a coefficient that is both significant and negative. Being black is also highly negatively correlated, -.322, with education level attained in 1971. This result indicates that blacks did not achieve the same levels of education as did whites. Also notable is that within a disaggregated, black-only sample, veteran status is not significant. This is in contrast to earlier findings that blacks received positive returns to military service, and in particular maintained earnings advantages over black non-veterans. This finding may be indicative of a trend in the United States toward greater integration and

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equality for blacks, particularly during the 1970's. The necessity for blacks to bridge the economic gap may not be as significant as it once was, thus black veterans may be losing their primary advantage over black non-veterans.

B. EFFECTS OF MILITARY EXPERIENCE ON EARNINGS

Table XII presents a summary of the earnings growth rate model regression results when the change in military experience variable is substituted for veteran status. The estimated results provide an almost mirror like image to that of the veteran status equation results. Both the estimated coefficients and the standard errors appear to be similar to those discussed for all significant explanatory variables. There are however, two interesting results concerning the insignificant variables.

The change in military experience variable, MILEX.D2, having been estimated separately from veteran status, was expected to have a significant impact on the earnings growth equation. Unfortunately this variable was found to be insignificant. Lazear's [Ref. 25] success with this variable is due to his use of 1966 to 1969 as the study period. During this period, the majority of those who were to become veterans were serving their military service. By 1971, a relatively small number of young men responding to the NLS were yet to serve, resulting in extremely small cell sizes. In dealing with a "change" in military experience variable, those individuals who completed their service

TABLE XII

REGRESSION RESULTS OF EARNINGS GROWTH RATE MODEL
WITH CHANGE IN MILITARY EXPERIENCE

VARIABLE NAME	B	STD ERR	SIG T
SIGNIFICANT EXPLANATORY VARIABLES			
EDUC.D2	.042	.017	.017
EDUC.71	.115	.007	.001
MRSTA.71	.157	.040	.001
TENUR.81	.024	.003	.001
HOURS.D2	.008	.001	.001
AGE.71	− .015	.006	.014
UNWAG.81	.068	.038	.072
BLACK	− .281	.044	.001
INSIGNIFICANT EXPLANATORY VARIABLES			
MILEX.D2	.006	.010	.568
GENTRA	.084	.061	.165

EQUATION CHARACTERISTICS

R^2	.276	N Cases	1560
Adj R^2	.271	Durbin-Watson Test	1.966
F Statistic	58.961	Significance	.001

prior to the study period had the same net effect on earnings growth as those who never served, as the change in experience in both cases equaled to zero. Compounding the problem of small cell sizes with respect to experience, is the inordinately large number of missing values. Only 422 of 714 veterans contained the necessary information from both 1971 and 1981 to compute the change in experience. Only 25 of the 714 veterans in the sample reported any increase in military experience during the period.

Although general military training was again found to be insignificant, it had improved upon its significance in the veteran status equation (from $P = .644$ to $.165$). This finding is probably a result of a lower degree of simple correlation between the general training variable and MILEX.D2 ($.254$) than existed between GENTRA and veteran status ($.660$).

C. SUMMARY OF RESULTS

Since the end of the Vietnam War veterans have been experiencing beneficial returns from military service. Their earnings growth rates are steeper than those of non-veterans. Among possible reasons for this reversal in previous trends may be a reacceptance of military service as a screening tool by employers. The trend reversal may also be a result of a vector of intangible qualities the military instills in individuals, such as a sense of purpose, self esteem, leadership opportunities at a relatively young age,

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and a willingness to accept responsibility. Perhaps we are witnessing the same returns that veterans of World War II and Korea have experienced, only these returns had been suppressed during the Vietnam War, and continued to be suppressed until shortly after the war due to its unpopularity. In any event this reversal is worthy of continued study.

Unfortunately the earnings growth rate results have been inconclusive in two very important areas of continued concern: returns from general military training and from increases in military experience. Determination of the effects of these two factors are essential in future policy decisions.

Earlier research reported that blacks suffered in comparison to whites with respect to annualized earnings. This study goes one step farther by concluding that blacks also suffer disadvantages with respect to earnings growth rates. Of equal importance is that black veterans may no longer maintain the economic advantages that they once did, as a result of their military service. This finding may indicate that socio-economic gaps, once quite wide, may now be narrowing due to integration and greater equality throughout the United States.

Educational level attainment and increases to those educational levels are not only excellent estimators for annualized earnings, as reported by previous researchers,

but are also the highest contributors toward the estimation of earnings growth rates.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

A number of interesting conclusions can be drawn from the analysis conducted in this study. First, and perhaps most significant, veteran status provides economic returns to individuals in the form of more rapidly increasing earnings. Since both changes in military experience and general training were found to be insignificant contributors to wage growth, one must wonder what inherent quality of military service or veteran status is contributing to these returns. One hypothesis offered here, is that there has been a resurgence among employers to use completed military service as a screening tool for civilian employment. Another possible explanation is that there are certain inherent qualities that the military passes onto its members that are difficult to quantify such as leadership, self esteem, a sense of accomplishment, and a willingness to accept responsibility. These inherent qualities contribute to the veterans employment alternatives as well as promotion and earnings rates. Perhaps the most plausible explanation for these results concerning general training and changes in military experience, is that the data is limited, resulting in small cell sizes, which may result in reduced levels of significance.

The two variables relating to military acquired human capital, changes in military experience and general training, were found to be insignificant. Unfortunately, this finding prevents a valid comparison from being made between returns to civilian and military sources of human capital.

Consistent with previous research that measured returns in terms of annualized earnings, black veterans continue to receive lower economic returns to military service than do whites. Within the confines of this study it can be concluded that the black veterans' wage growth rates were not as great as those of whites. Furthermore, black veterans who had consistently and significantly out-earned black non-veterans due to positive economic returns to military service, may no longer retain these advantages over their non-veteran cohorts. The differences between the black veterans and non-veterans were insignificant, however, which may be an initial indication of increasing socio-economic levels among blacks due to increasing equality and integration practices evolving during the 1970's.

Education was found to be the primary contributor to wage growth rate. Of particular significance was the educational level attained earlier in an individuals lifetime.

B. RECOMMENDATIONS

As previously discussed there exists an enormous need to explore the economic returns to all-volunteer force era veterans, for military service, experience, and training. Studies of this type could have a significant impact on future military manpower policy alternatives, and decisions. Unfortunately no adequate longitudinal data base exists that would provide the necessary information to conduct studies of this type on post-Vietnam era veterans. It is recommended that an NLS type survey be conducted using a more recent cohort to establish the necessary data for future study.

Using the new longitudinal survey data, future research should attempt to estimate both annualized earnings and wage growth rates for all-volunteer force era veterans and non-veteran cohorts. How well recent veterans compare to the Vietnam Veterans concerning earnings comparisons to civilian cohorts is another area of useful study.

In the era of the all-volunteer force, as general, transferable, military training has reached a peak due to its draw upon new recruits, the potential for research in the area of returns to military training and OJT type experience have never been greater. Let us take advantage.

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